SPRING-LOADED THREADED FASTENER HOLDER

BACKGROUND OF THE INVENTION

1. Field of the Invention.

The present invention relates to a spring loaded threaded fastener holder. More specifically, the present invention relates to a spring loaded threaded fastener holder that is used as an accessory of a screwdriver for use in retaining a screw in position at the distal end of a screwdriver.

2. Discussion of the Related Art.

In this specification, the term "screwdriver" is taken to incorporate, but not be limited to, a posi-drive screwdriver, an alien key driver, a phillips screwdriver, a cross-point screwdriver, a flat head screwdriver, a star point screwdriver and a socket head screwdriver, which can be manually operated or which can be driven by a power tool or the like.

In order to urge a screw into a surface, the screw must be held in an operative position, usually by hand, whilst a screwdriver is held in the other hand and engaged with the screw head and the screw is axially rotated until it catches sufficiently in the surface, whereupon the hand used to hold the screw can be removed. This is often disadvantageous as the screw may be too small to grip effectively, or the work area may be cramped making it difficult or impossible to hold the screw whilst screwing it in, and the need for using two hands often precludes a user from using his or her hands to steady himself or hold other items.

To alleviate these problems, magnetized screwdriver tips are known. Magnetized screwdriver tips have the disadvantage in that they can sometimes be insufficiently magnetized and a screw will fall off the end of the screwdriver before being fastened in place. The screw may also magnetically attach itself to the shaft of the screwdriver instead of the end of the screwdriver tip, requiring that the screw be re-positioned correctly at the end of the head. The magnetized screwdriver head may also magnetize the screw itself, which may be disadvantageous in certain circumstances.

Putty has also been employed to retain screws on the tip of a screwdriver. The putty becomes dirty, dries out and becomes ineffective. The putty can also fall off the screwdriver, which can be problematic if it falls into sensitive equipment. Additionally, if

the screw is to be inserted into a bone, putty can not be used as it is typically disadvantageous to add unnecessary foreign objects into the body.

An additional prior art manner of retaining screws on the tip of a screwdriver is illustrated in Figures 1-3. More specifically, a threaded fastener holder 10 is slidably connected to about the shaft 12 of the screwdriver. Holder 10 includes a sleeve 14 having a gripping flange 16 at its proximal end and a plurality of spring fingers 18 at its distal end.

In use, the threaded fastener holder 10 is held such that the user can grasp the sleeve 14 with their hand and slide the, including the plurality of fingers 18, axially in the distal direction, from a retracted position to the position illustrated in Figures 1 and 2. During this process the user can connect the fingers 18 to the head of a threaded fastener 106. The tool can then be used in a manner know to those skilled in the art to insert threaded fastener 106 into a bone. Once the threaded fastener is sufficiently inserted into the bone, the fingers 18 will engage with either the bone, or a fastening plate 20. This engagement causes problems for the user because he or she can no longer see the screw at the point when the screw is about to be fully inserted into the bone. Thus, the user will typically at this time grasp the flange 16 and axially move the holder 10 in the proximal direction as illustrated in Figure 3. However at this critical point in time the user would prefer not to interrupt the screw insertion process and use on of their hands to manually move the holder in the proximal direction. Thus, there is a need in the art for a threaded fastener holder that will hold the screw in place at the distal end of the screwdriver, and then automatically disengages from the screw and withdraws axially in the proximal direction to permit the user to continue inserting the screw without interruption.

SUMMARY OF THE INVENTION

The present invention accomplishes this need with a threaded fastener holder having a shaft having a distal end for selectively engaging with a head of a threaded fastener. A handle is connected to a proximal end of the shaft. An inner sleeve surrounds at least a portion of the shaft. The inner sleeve is axially movable with respect to the shaft. The inner sleeve has a plurality of spring fingers disposed at a distal end of the inner sleeve. The plurality of spring fingers each has a distal end that are radially movable so as to be selectively engageable with the head of a threaded fastener. A spring has a first end and a second end. The first end of the spring is fixed with respect to the inner sleeve. The second end of the spring is fixed with respect to the shaft, wherein, in the rest position, the

distal end of the plurality of spring fingers is axially spaced from the distal end of the shaft.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

The above and still further objects, features and advantages of the present invention will become apparent upon consideration of the following detailed description of a specific embodiment thereof, especially when taken in conjunction with the accompanying drawings wherein like reference numerals in the various figures are utilized to designate like components, and wherein:

Figure 1 is a perspective view of a threaded fastener holder in accordance with the Prior Art;

Figure 2 is a partial front view of the threaded fastener holder of Figure 1 shown inserting a screw into a surface with a fastening plate located there-between;

Figure 3 is a partial front view of the threaded fastener holder of Figure 1 being manually moved axially in the proximal direction;

Figure 4 is a front view of the threaded fastener holder in accordance with the present invention;

Figure 5 is a front view of the threaded fastener holder of Figure 4 shown engaged with a threaded fastener;

Figure 6 is a front view of the threaded fastener holder of Figure 4 shown with the threaded fastener holder automatically moved into an axially proximal position;

Figure 7 is a cross-sectional view taken along line 7-7 of Figure 6 and looking in the direction of the arrows; and

Figure 8 is a cross-sectional view taken along line 8-8 of Figure 5 and looking in the direction of the arrows.

DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EXEMPLARY EMBODIMENT

Referring now to Figures 4-8, a threaded fastener holder 100 in accordance with the present invention is illustrated. The threaded fastener holder 100 includes a shaft 102 having a distal end 104 for selectively engaging with a head of a threaded fastener 106, and a proximal end 108. A handle 110 is connected to the proximal end 108 of shaft 102.

An inner sleeve 112 surrounds at least a portion of shaft 102. Inner sleeve 112 is axially movable with respect to shaft 102. Inner sleeve 112 has a plurality of spring

fingers 114 disposed at a distal end of inner sleeve 112. Each of the spring fingers 114 has a distal end that is radially movable with respect to the longitudinal axis of the shaft so as to be selectively engageable with the head of threaded fastener 106.

A spring 116 has a first end 118 and a second end 120. The first end 118 of spring 116 is fixed with respect to inner sleeve 112. More specifically, first end 118 is fixedly connected to an enlarged proximal head portion 122 of inner sleeve 112. The second end 120 of spring 116 is indirectly fixed with respect to shaft 102. More specifically, second end 120 is fixedly connected to an end cap 124, which is fixedly connected to an outer sleeve 126. Outer sleeve 126 is fixedly connected to a second nut 128, which is fixedly connected to handle 110. Outer sleeve 126 surrounds at least a portion of inner sleeve 112. Handle 110 is fixedly connected to shaft 102.

In a rest position, the distal end of the spring fingers 114 is axially spaced from the distal end 104 of shaft 102 by distance A, as illustrated in Figure 6. When the spring fingers engage the head of a threaded fastener 106, the distal end of the spring fingers 114 is approximately axially aligned with the distal end 104 of shaft 102, as illustrated in Figure 5.

In use, the threaded fastener holder 100 is held, preferably by handle 110 with one hand, and the user can grasp the inner sleeve 112 with their other hand and slide the inner sleeve, including the plurality of fingers 114, axially in the distal direction B, from the position illustrated in Figures 4 and 5 to the position illustrated in Figure 6, thereby placing spring 116 under tension. During this process the user can connect the fingers 114 to the head of a threaded fastener 106. The tool can then be used in a manner know to those skilled in the art to insert threaded fastener 106 into a bone. Once the threaded fastener is sufficiently inserted into the bone, the fingers will engage with either the bone, or a fastening plate 20 which engagement automatically causes the fingers 114 to disengage from the head of the threaded fastener 106. Once the fingers 114 are disengaged from the threaded fastener 106, the tension placed on spring 116 will cause the inner sleeve 112 to move axially in the proximal direction C from the position illustrated in Figures 4 and 5 to the normal or rest position illustrated in Figure 6.

Thus, while there have been shown, described, and pointed out fundamental novel features of the invention as applied to a preferred embodiment thereof, it will be understood that various omissions, substitutions, and changes in the form and details of the devices illustrated, and in their operation, may be made by those skilled in the art without departing from the spirit and scope of the invention. For example, it is expressly intended

that all combinations of those elements and/or steps which perform substantially the same function, in substantially the same way, to achieve the same results are within the scope of the invention. Substitutions of elements from one described embodiment to another are also fully intended and contemplated. It is also to be understood that the drawings are not necessarily drawn to scale, but that they are merely conceptual in nature. It is the intention, therefore, to be limited only as indicated by the scope of the claims appended hereto.